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Comments on the taxonomic status of "*marchandi* De Freina" in SE Turkey (Lepidoptera, Arctiidae)

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Abstract*:* Comments on the taxonomic status of "*marchandi* De Freina" in SE Turkey (Lepidoptera, Arctiidae). *Misc. Pap*. 189: 1-3, 1 fig 2 Tables.
This paper deals with the molecular evaluation of the taxa *Arctia villica* and *marchandi* in SE Turkey. As a result of this, the name *marchandi* is proposed as a valid subspecific name of the *Arctia villica* populations of SE Turkey.

Key words: *Arctia, villica, marchandi, festiva,* Arctiidae, Lepidoptera, Turkey, mtCOI, genetic distance.

The genus *Arctia* was established by Schrank in 1802 (Fauna boica 2 (2): 152). Its type-species *Phalaena caja* Linnaeus,1758 was designated by Westwood in 1840, subsequently. The name *marchandi*, proposed by De Freina (1983) with the name combination "*Arctia villica* ssp. *marchandi*" from "Zab-Tal" Zab Valley (Hakkari Province). *Marchandi* was used as valid name in various papers as a subspecies of *Arctia villica* (Linnaeus,1758). De Freina (2011) published a revisional work on *Arctia villica*-complex. He proposed there *marchandi* as a distinct species, by basing upon the genital morphologic and genetic differences to *A. villica*.

In this paper, the mtCOI barcodes (658bp) of *Arctia villica*, *Arctia marchandi* and *Arctia festiva* populations from various localities in South and East Turkey have been evaluated. Among these taxa *Arctia villica* and *Arctia festiva* are well established, distinct species. The last name *marchandi* was suggested by De Freina (2011) as a distinct species. So far, the value of the genetic distance between *villica* and *marchandi* given by De Freina has not been confirmed in a publication. In fact, there is no clear, numerical calculation on the genetic distance between *villica* and *marchandi* in De Freina's (2011) paper. It is almost impossible to understand and calculate the distance properly, by looking to Freina's (2011: 97) tree diagram. This situation inevitably leads to some doubts. Consequently, it resulted in a discussion of the molecular evaluation and phylogenetic position of *Arctia villica*.

The mtCOI gene sequences in Boldsystems and CESA BarcodingBank **(Table 2)** were selected for phylogenetic estimation of *Arctia villica*. Genetic distances between the populations were calculated based on the Kimura 2-parameter (K2P) model and phylogenetic relationships were assessed using the neighbour-joining (NJ) algorithm to construct gene trees with 1,000 replicates to evaluate internal nodes of the trees in MEGA6.

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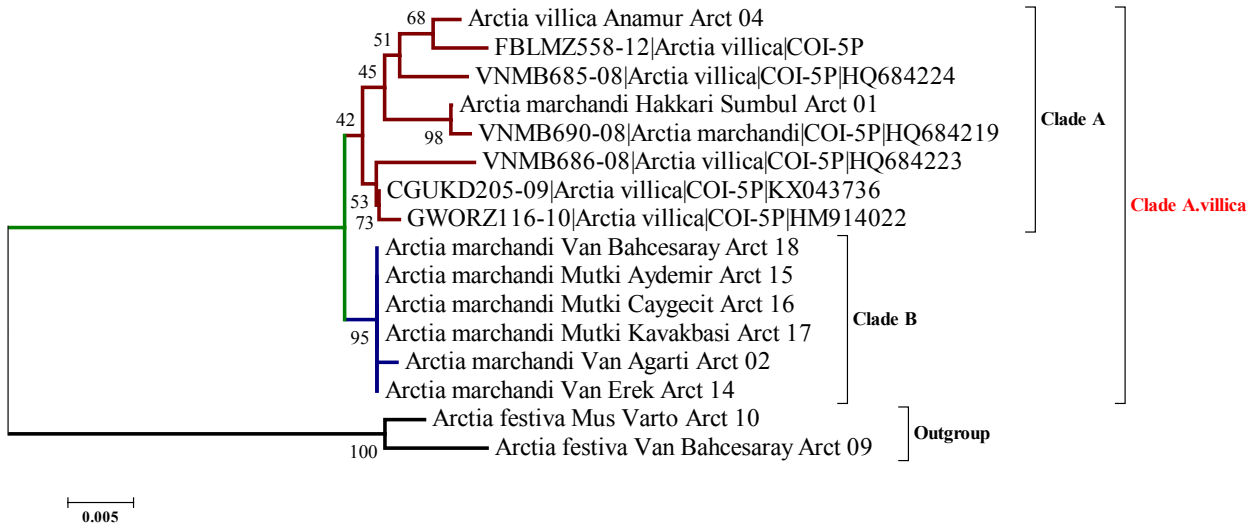

Fig. 1 - Kimura 2-parameter (K2P) distance neighbour-joining tree of COI gene sequences of *A.villica*, *A.villica marchandi* and *A. festiva* (outgroup) with bootstrap values.

In our phylogenetic tree populations of *Arctia villica* and *Arctia marchandi* were clustered in Clade A and Clade B **(Fig. 1)**. Clade A was consist of *Arctia villica* and *Arctia marchandi* populations, Clade B was only consist of *Arctia marchandi* populations from East Turkey. Hakkari populations of *Arctia marchandi* have a sister position with *Arctia villica* populations in Clade A instead of populations in Clade B. This clearly shows that *Arctia villica/marchandi* is not a monophyletic group. Genetic distances based on K2P model were showed in **Table 1**. The K2P model genetic distances between populations of *Arctia villica* and *Arctia marchandi* is ranging from 0.2% to 1.4%. In Lepidopteran an empirical 2% (K2P) intraspecific distance value has often been proposed. In the present study, DNA barcode divergence between controversial pair of species was lower than 1.4%.

Table 1 - Percent pairwise corrected (K2P) genetic distance among the *Arctia villica*, *A. marchandi* and *A. festiva* COI sequences

1. Arctia marchandi Hakkari Sumbul Arct 01															
2. VNMB690-08|Arctia marchandi|COI-5P|HQ684219	0.002														
3. CGUKD205-09|Arctia villica|COI-5P|KX043736	0.009	0.011													
4. Arctia marchandi Van Bahcesaray Arct 18	0.011	0.012	0.005												
5. Arctia marchandi Mutki Aydemir Arct 15	0.011	0.012	0.005	0.000											
6. Arctia marchandi Mutki Caygecit Arct 16	0.011	0.012	0.005	0.000	0.000										
7. Arctia marchandi Mutki Kavakbasi Arct 17	0.011	0.012	0.005	0.000	0.000	0.000									
8. GWORZ116-10|Arctia villica|COI-5P|HM914022	0.011	0.012	0.002	0.006	0.006	0.006	0.006								
9. VNMB685-08|Arctia villica|COI-5P|HQ684224	0.011	0.012	0.011	0.012	0.012	0.012	0.012	0.012							
10. Arctia marchandi Van Erek Arct 14	0.011	0.012	0.005	0.000	0.000	0.000	0.000	0.006	0.012						
11. Arctia marchandi Van Agarti Arct 02	0.012	0.014	0.006	0.002	0.002	0.002	0.002	0.008	0.014	0.002					
12. Arctia villica Anamur Arct 04	0.012	0.014	0.009	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.012				
13. FBLMZ558-12|Arctia villica|COI-5P	0.012	0.014	0.012	0.014	0.014	0.014	0.014	0.014	0.011	0.014	0.016	0.006			
14. VNMB686-08|Arctia villica|COI-5P|HQ684223	0.014	0.016	0.008	0.012	0.012	0.012	0.012	0.009	0.016	0.012	0.014	0.014	0.017		
15. Arctia festiva Mus Varto Arct 10	0.065	0.065	0.061	0.060	0.060	0.060	0.060	0.063	0.063	0.060	0.061	0.070	0.067	0.069	
16. Arctia festiva Van Bahcesaray Arct 09	0.070	0.070	0.067	0.065	0.065	0.065	0.065	0.069	0.069	0.065	0.067	0.072	0.069	0.074	0.011

Genetic distances between populations were not clearly reported in Freina's paper. Taking the K2P model genetic distances between populations of *Arctia villica* and *Arctia marchandi*, ranging from 0.2% to 1.4% into consideration, we propose here *marchandi* as a valid subspecific name of *Arctia villica*, as in the original form **(ssp. rev.)**

Table 2 – List of collecting places and their process ID of the the taxa used in tree diagram

Name of taxa under examination	**Collecting data from Turkey**	**Process ID** (Fasta)
Arctia villica ssp. marchandi	TR – Hakkari Prov., Sümbül Mt 1350m, M.Kemal & A.Koçak leg.	Lep-Arct01, 658bp
Arctia villica ssp. marchandi	TR – Van Prov., Ağartı, M.Kemal & A.Koçak leg.	Lep-Arct02, 658bp
Arctia villica villica	TR – İçel Prov., Anamur, M.Kemal & A.Koçak leg.	Lep-Arct04, 658bp
Arctia festiva	TR- Van Prov.,, Bahçesaray, Vasting, M.Kemal & A.Koçak leg.	Lep- Arct09, 658bp
Arctia festiva	TR- Muş Prov., Varto, Armutkaşı, M.Kemal & A.Koçak leg.	Lep- Arct10, 658bp
Arctia villica ssp. marchandi	TR- Van Prov., Erek Mt., M.Kemal & A.Koçak leg.	Lep- Arct14, 658bp
Arctia villica ssp. marchandi	TR- Bitlis Prov., Mutki, Aydemir, M.Kemal & A.Koçak leg.	Lep- Arct15, 658bp
Arctia villica ssp. marchandi	TR- Bitlis Prov., Mutki, Çaygeçit, M.Kemal & A.Koçak leg.	Lep- Arct16, 658bp
Arctia villica ssp. marchandi	TR- Bitlis Prov., Mutki, Kavakbaşı, M.Kemal & A.Koçak leg.	Lep- Arct17, 658bp
Arctia villica ssp. marchandi	TR- Van Prov., Bahçesaray, Vasting, M.Kemal & A.Koçak leg.	Lep- Arct18, 658bp

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